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Student Medicine

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Student Medicine

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Editorial Comment

TUBERCULOSIS CONTROL ON THE COLLEGE CAMPUS

NOT infrequently one hears or reads a statement to the effect that tuberculosis no longer is a serious problem, and various predictions have been offered that this disease will soon be eradicated. It is true that tremendous strides have been taken in the diagnosis, treatment, and control of tuberculosis. A very real danger exists if we become complacent and relax our efforts to find and to control every case of tuberculosis.

The incidence of tuberculosis has steadily decreased over the past decades, until now probably fewer than 15 to 20 per cent of native-born students would be found to be positive on tuberculin testing, and few indeed are the cases of clinical tuberculosis to be found.

But while the incidence of tuberculous infection has been decreasing in American students, something has been happening in many schools. Increased numbers of students from foreign countries have been coming to our colleges and universities to study. In this group the situation is very different. There is a very high incidence of tuberculin reactors, and on chest x-ray many show evidence of previous infection, and, indeed, a few show active disease despite the fact that all are examined before entering this country. Many of those who show evidence of what are considered to be stable or healed lesions will have reactivation of their infection and become potential sources of infection to those around them.

We must then redouble our vigilance if we are to maintain our gains toward eradication of tuberculosis. We must expend more time and energy to find each case in American students than formerly because active infections are now fewer in number. Yet, if we miss one, the resultant exposure of others will soon undo our gains. In the foreign-student group our initial surveillance must be careful so that active cases of tuberculosis are excluded from our campuses, and all

of these students must periodically be re-examined so that no case of reactivated disease goes long undetected.

Much the same situation also exists in the general population. There has been a rather constant stream of displaced persons and refugees from communist-dominated areas entering this country. In the main they came from countries where the incidence of tuberculosis is high, and undoubtedly many of them harbor live tubercle bacilli in their bodies and thus constitute a real health hazard, for some will sooner or later develop active, contagious tuberculosis. It is to be hoped that all health agencies will remain alert to this danger and take the necessary steps to detect early and treat promptly any case of tuberculosis which may develop in this group.

It seems quite appropriate that there appears in this issue an article by Dr. Gertrude Huberty which describes the essential characteristics of a tuberculosis detection program in a college or university population. It seems to this writer that greater stress might be laid on a tuberculin testing program, for despite the drawbacks of tuberculin testing it has definite advantage over the x-ray survey alone. There is good reason to believe that a positive tuberculin reaction indicates that somewhere in the body there are living tubercle bacilli and that a negative tuberculin reaction, with rare exceptions, is a guarantee that the person is free of infection with tubercle bacilli. A negative x-ray gives no such assurance, but to the laity, and perhaps to too many physicians, a negative chest x-ray is considered to be evidence of freedom from tuberculosis. This it is not. It is only evidence that there is no area of infection in the lungs large enough to cast a shadow recognizable in the x-ray. It does not rule out the very small pulmonary lesion of primary tuberculosis, and it is of little value in the detection of extrapulmonary infection.

Dairymen have been able to eradicate tuberculosis from their herds. They have done this, not by the detection of animals with clinical disease, but by the detection of tuberculin reactors. There appears to be a valuable lesson in this. It seems probable that only by finding all tuberculin reactors in a human population and examining them regularly by x-rays and other appropriate means that tuberculosis can be eliminated from that population.

The Practice of Student Medicine*

NORMAN S. MOORE, M.D., CORNELL UNIVERSITY

AS YOU all know, student medicine which involved some clinical responsibility began at Amherst College just one hundred years ago this year, with President William A. Stearns and Dr. Edward Hitchcock of Amherst in cofounder roles. President Stearns, the humanitarian, and Dr. Hitchcock, the physician-educator, united public health, clinical medicine, health education, physical education, and mental hygiene into what was to be known as student health for seventy-five years. During that period first one and then another of these components received the major emphasis.

Some of you were in college during the "sanitation era," when stress was placed on the elimination of conditions which predisposed to disease. Fortunately the development of efficient local health departments relieved the need for public health emphasis in colleges. Others of you will remember that when you were in college a compulsory course in hygiene seemed to be the most concrete example of a medical program. I happened along in college during that health education era. The emphasis has changed over the years, and in the main it has paralleled changes in patterns of medical practice.

For the last two decades more attention has been given to medical problems of men and women of college age, and there has evolved in American educational institutions a philosophy of student medicine quite different from the student health practices of an earlier day. During the decade before World War II, a change in the concept

* Presented at a conference at Syracuse, New York, on Student Health Services, State University of New York, October 23, 1956.

of responsibility in student welfare began to take place in many universities. At that time infections and suicides were the major causes of death during college years. Sulfonamides, the earliest antibiotics, required early diagnosis and treatment to be effective. Suicide pacts of the 1920's were followed by an epidemic of suicides among students during the 1930's. To reverse this trend on the university campus, a combination of strong preventive and clinical measures became necessary. A college health department could no longer stand on the doctrine that public health measures and health education discharged its obligation to students, parents, faculty, and administration. If the mortality rates from mental and organic disease were to be reduced, a broader program meeting the total health needs of students was indicated, a program which provided clinical medical care in addition to preventive and public health measures.

Over the years we have developed a program aimed at the resolution of campus medical problems by closer integration of the medical facilities with other university departments. It is my purpose today to discuss these problems in terms of needs of students, faculty, and administration in a manner which will show the integration of the medical department with the rest of the university and the part the medical department can play in the educational process when interrelationships are built on a high caliber of understanding and mutual helpfulness. Because all my experience in student medicine has been at Cornell University, much of what I shall discuss was explored and studied by our group there before it was adopted as sound philosophy of practice.

Student Needs

The need for complete medical care for illness and accident is obvious. By a system of controls, complete, effective, and supervised clinical care can be provided to students. These services should take responsibility for all illness, physical and emotional, acute and chronic, in either a clinic or an infirmary or in another institution. By responsibility I mean that those having illnesses which can be treated locally should be given early adequate therapy; those having illness beyond the scope of either local facilities or medical skills should be transferred promptly to a place where skills and facilities

are adequate, or the necessary skills and facilities should be brought to the patient. To meet clinical needs, a college or university must have someone medically responsible. This responsibility can be filled by a part-time physician in a small community or by a clinic and student hospital with a large staff in the case of a great university. Small or large, the important point is that the college or university delegate its responsibility to one competent person. In addition, the clinical services should make available to the student, through the doctor-patient relationship, a center for medical information. Also, an individual physician, either working alone or in a clinic, affords the opportunity for the student to make personal contact with an adult in a way quite different from group or classroom contacts—a need which in our experience appears great and which under modern-day student-faculty relationships is not adequately fulfilled. One university I know of, believing that the economic factor is partially responsible for changing faculty-student relationships, reimburses faculty wives for the cost of informal student-faculty get-togethers. Often the reassurance a student receives regarding the nature of an illness of a family member, mentioned in a letter from home, can change excessive anxiety which interferes with scholastic accomplishments to normal concern for a relative's welfare with little influence on academic efficiency.

Relationships of student patients with those offering clinical services result in a maturing of the student and of his orientation regarding the patient role. Students learn that excessive demands, description of symptoms in superlative terms, or distortion of a physician's comments cause disapproving reactions from the doctor. It is our belief that much is accomplished by the individual student who learns early in his college career that an important part of obtaining good medical care is being a good patient, that is, that physicians are more interested in and want to help people who make normal demands and are inclined to be less interested in those who make unreasonable demands. It is our opinion that the experience of having a personal physician of his own for the first time and apart from his family's physician begins his preparation for later medical experiences and that anticipation of and preparation for those experiences can best be taught by insight obtained from actual college illness experience.

Thus we believe provision should be made for students to choose their own physician and stay with him rather than be shuttled to whichever office door is open.

The changing patterns of medical practice from decade to decade brought about by ever-changing knowledge of disease processes and social advancement often leave the head of a household bewildered and confused about how to proceed in case of illness. How efficiently that person breaks through this confusion is often a matter of knowledge of the proper patient role. It is enlightening to observe behavioral patterns among student patients. These patterns seem dependent on childhood, family, and social influences. Those who come from rural areas, probably living where medical care is more difficult to obtain, whose self-reliant parents often have made the decision in their childhood whether or not the services of a physician were necessary, have different attitudes and emotional responses to illnesses than those coming from urban centers, where parents are more apt to be dependent on medical advice for minor troubles. While all students do not have the advantage of patient-role orientation through actual illness experience, those who do gain something which is available nowhere else on the campus. This orientation teaches responsibility not unlike the responsibility that the student has to learn when managing money for the first time.

Faculty Needs

As an integral part of a campus community it is important that the medical department also direct its attention to faculty needs. The faculty has need for a place to which they can refer students who come to them for advice and who appear to have excessive or abnormal reactions to their problems. At times the medical department appears to be a depository for students with all sorts of problems. We realized this at an early date and appointed a health counselor who established a liaison between the medical department and the counseling offices. This arrangement has kept other types of problems, such as financial, personal relations, scholastic, or living difficulties, separate from medical problems, and as a result nonmedical problems are resolved by persons trained in professional counseling methods and techniques. Here we might mention the role of the doctor, for he too must play the traditional medical role or suffer in his relationship

with the student. Many times a lonely student consults a physician as a faculty contact. If such a relationship is fostered by the doctor, the student may tend to think of him more as a counselor than as a doctor and thereby reduce his effectiveness in times of illness. We have studied these relationships and have tested concepts of the doctor role. We firmly believe that medical personnel and counseling personnel can work together toward a common goal if each leaves the other to play its respective role.

Knowledge of the medical status of a student in academic difficulty is an important faculty need. The medical department can meet this need by creating a medical evaluations committee which at the end of each term reviews the medical records of those students who have failed academically. It seeks to discover whether medical illness was a contributing factor to the scholastic failure. Over a period of years it has been our experience that about 3 per cent of academic failures are results of medical problems and that in about 3 per cent more failures illness may play a partial role, though certainly not the major one. At Cornell the Medical Department Committee performs this function willingly and carefully. The work of this committee safeguards both the student and the faculty against the abuse of illness as an excuse for failure. Communication with faculty about the medical status of students involves the development of an understanding of medical ethics by both the faculty and the student. There is no facet of medical operation around a university more likely to bring both sides to the brink of war than when the question of medical ethics becomes involved in the process of communication. The student needs to have the faculty member understand his difficulty, but the faculty member does not have to know the details of the illness or even the diagnosis. It is here, however, that the overcurious faculty member, by pressing, can injure the medical program, because if the student feels his medical record is not confidential, the next time he is ill he is likely to by-pass the clinic or individual doctor. From our point of view, no matter how good the medical program may be, it is ineffective if the student does not avail himself of the facilities offered.

The problem of excuses for illness is often raised by faculty members, especially by those members who expect written excuses from the medical department. If the educational process involves the maturing of the student, it remains a cause of concern to the medical

staff why certain faculty members want to treat college students as if they were eighth graders. The excuse system so largely practiced in American educational institutions is not good. Making a student face up to responsibility for loss of time because of illness is an important part of his conditioning for later life responsibility. To make malingering easy or to foster temptation to shirk responsibility at the student age is not, in our opinion, good education. In addition, the excuse system demoralizes the doctor-patient relationship. The penalty of illness must be realized. The student must learn that that which is unavoidable must be taken in stride emotionally, even though plans have to be suddenly changed with resulting disappointment. For illness, which can in part be avoided, the physician can bring into focus the importance of prevention. Experience is the best teacher, if the student has mature interpretation available for differentiation of values.

At Cornell the system of not providing written excuses for medical illness, but of corroboration if the faculty inquires, works well. A closer medical-faculty relationship on every campus can contribute much to the educational process.

The faculty has need for medical advice, personal and otherwise. Although most student health departments do not provide medical care for faculty, there is often considerable service a medical department can render, i.e., confidential consultation regarding mental illness in faculty families and advice about medical problems involving members of their own department or even their own families—advice as to where to go, whom to see. Because the department is usually the only medical unit on campus, many requests are received from faculty for medical information for research and teaching purposes, requests for lectures and seminars, for bibliography, for consultation on committee work or research. Conversely, these same faculty members usually participate in the medical department's research planning, staff meetings, and seminars.

Administration Needs

It has long been obvious to the alert observer that college health departments, not unlike physicians in general, often become isolated from other disciplines and ignore administration's problem with such things as admission policies, attrition rates, behavioral problems, and public relations, both internal and external. As physicians have been

accused of sitting in ivory towers while problems accumulate, so have many university administrators felt that their medical departments were aloof from the day-to-day vexing problems. In fact, more than one college president has said to me that he likened the medical department to a building and grounds department which fixes classroom seats so that the product—the student—can listen to the professor, while the medical department fixes the student—the product—so that he can sit on the seat.

Our group believes that the medical department has direct responsibilities in assisting administration on every level where department members are qualified to assist. We might begin a discussion of meeting some administration needs by mentioning deans, who traditionally sit behind desks piled with trouble and feel that few outside their office are willing to help lower that pile. Deans frequently become the persons on whom parents focus pressure of all sorts—pressures ranging from an inquiry as to why a son or daughter is treated this way or that, to the mobilization of the heavy artillery of influential friends, relatives, and alumni who may offer expert opinion relevant or irrelevent, as the case may be. Frequently these cases involve students who are so unstable that the only solution is medical treatment away from the university for a time and re-evaluation of health status and potential academic ability before re-admission. If by study, a review of medical records, or an evaluation of stability, the medical department can point to a logical solution, everyone connected with the problem —student, parents, and administration—benefits.

A faculty administrative committee charged with the responsibility to judge student conduct sometimes prescribes punitive measures before it is known whether the case involves medical illness. As you well know, once the punitive measure is taken, the true medical component is difficult to determine. If there is consistent and friendly orientation of members of such a committee with the medical department, its chairman will refer to the medical department questionable cases for study before punitive action is taken, thereby separating the really emotionally sick students who need medical care more than discipline from the delinquency cases where punitive measures of various degrees are indicated.

In another area, a university can become a large employer of nonacademic people who come under the Workmen's Compensation

Law. Even with the fast-developing safety divisions so prevalent today on college campuses, accidents do and will continue to happen. What happens to these people is more than the economic responsibility of the college or university. There has grown up a feeling in most college administrations that they have a moral obligation to see that these people are treated adequately and that the quality of medical care is of high standard. While the medical department may not take primary clinical responsibility for these cases beyond first aid, the university's interest in the injured employee can be expressed through adequate lines of communication between the medical department and the private physician. Also, the employee who is ill or injured and who is on a medical leave of absence and who wants to return to work is of concern to administration, as is the employee who has reached retirement age but is declared indispensable by the department head. In both these instances the medical department has an obligation to both the employee and to the university. All of these problems need medical evaluation which can be carried out in a medical clinic.

There is a need to help with educational problems which are of serious concern to top administration such as the high attrition rate. The costs of a college education are so high and there are so many candidates for admission that the attrition rate in American universities is fast becoming a major problem. It will be a great day when a university president can say to a parent, "Our place is expensive, but we give you reasonable assurance that your child will graduate."

It is fast becoming clear that the medical department is well equipped to find out something about the attrition problem. The vast waste involved when 50 per cent of students in American universities drop out before graduation is rapidly being recognized as a primary educational problem. The Cornell attrition rate is about 40 per cent, and one of our studies shows that at least one-quarter of this number leave the university in good academic standing. For the last year, another study in our department has been under way with the objective of finding out why these students leave college. Methods have been developed, the team is assembled and being trained, methods have been refined, and although no concrete results are yet available, the project has already arrested the attention of the Army, the Navy, and several foundations.

Other needs of administration are for the protection afforded by public health measures and for protection from legal repercussions of such practices as compulsory physical education. The local health department assists with public health, and in many instances the home physician now certifies before admission as to the student's ability to participate in physical education, intercollegiate athletics, and so on. All questionable candidates, however, should be rechecked by the college medical staff. Thus, the medical department staff interprets for various college administrators when there is contraindication to forcing the compulsory feature of exercise.

Last, but not least, the medical department must protect university administration from lawsuits by keeping its own house in order: by recruiting properly trained doctors, using medical procedures not open to question, having preventive medical controls for communicable disease, securing waivers for students having convulsive states, and preparing medically sound legislation for trustee approval. To discharge all of these responsibilities, the medical department staff must feel comfortable and at ease, knowing that it is intellectually equipped and has the facilities to carry out its duties. We have learned that mutual assistance, willingness to see the team successful without the need for individual glowing in that success, gives each member personal satisfaction and high reward.

While bricks and mortar and pleasant surroundings are important, they cannot substitute for the proper philosophy of operation. It is only when men and women of the medical staff fight professional deterioration and continually strive for insight that modern-day student medicine may be practiced successfully. No department in my opinion can achieve success without an objective. Perhaps it is untraditional for me to speak of objectives at the end of a paper. I feel, however, that once objectives are decided upon in the building of a student medical department they should be guides only and should never restrict thinking, experimental sorties in operational techniques, or critical observation of results; for only through these channels can objectives be revised to harmonize with changing goals which are continuously being influenced by better knowledge of the educational process. The primary objective of a college health department should be to assist students in their pursuit of an education and, where possible, to make a direct contribution to their education. As you will

see from comments already made, I believe that any medical department can work toward this simple objective by providing good clinical care for the ill and medical counseling for the well; by striving to preserve and improve the student's physical and emotional health and, through the educational process, by helping him to develop mature values and attitudes toward illness and proper understanding of good doctor and patient roles; by supervising sound preventive medical procedures in the control of communicable disease and in sanitation to protect him and the campus community from the disease ravages of yesteryear; by integrating the medical department activities with those of the faculty and administration and, by so doing, assisting faculty and administration to discharge its responsibilities to students and personnel of the campus community more effectively.

Lastly, may I say that the lines of communication between units of New York State University such as you represent are most valuable. While you all have the same fundamental problems, no two units can solve them in the same manner. For those of you who are new in the field, may I emphasize that orientation leads to insight, insight leads to efficiency, and efficiency leads to a high degree of success and personal reward.

I come from a campus which embraces four units of the State University, and because our department serves these units we become a collateral member of your family group. Any assistance which we can lend to any of you who may be new in the field of student medicine will be cheerfully and cordially dispatched. Above everything else, let us keep the lines of communication open, for with a group as resourceful as this no problem should go unsolved for long.

Tuberculosis Case Finding in a Student Health Program*

GERTRUDE TURNER HUBERTY, M.D.,
UNIVERSITY OF CALIFORNIA

IN ANY discussion of a tuberculosis case-finding program one is reminded that tuberculosis was one of the primary reasons for establishing student health services in a college setting. The original service in Amherst and the health services from England to Japan were all initiated primarily because of the frequency of tuberculosis as a cause of illness and death among the students.

Since that time, the techniques for diagnosing tuberculosis have changed from the detection of disease by clinical signs and the stethoscope to mass x-ray surveys and more recently to tuberculin testing as screening devices for finding individuals infected by the tubercle bacillus. Actually, a good program will take into account all of these techniques, for to ignore any of them will mean that some cases are overlooked.

The organization of a program in a university is relatively a simple one, since the group to be examined may be considered a "captive population." The sifting and screening processes used are limited only by available personnel and budget considerations. Faculty and nonacademic personnel should be included in this program.

The most frequently used screening device for tuberculosis case finding is the mass x-ray survey. Pictures are taken by a photofluorographic x-ray camera unit on a roll of 70 mm. film taking 350 to 400 exposures per roll. These are then read by roentgenologists or chest

* Presented at the 20th Annual Meeting of the Pacific Coast Section of the American College Health Association, held in Seattle, Washington, Nov. 11 to Dec. 1, 1956.

physicians to single out tuberculosis suspects. To many of the lay public this represents an infallible case-finding technique. In their minds all that is necessary to eliminate the disease from a given section of the population is an x-ray survey. The fact that this is only the very beginning of a sifting process is often not understood. All the clinical and diagnostic work of further x-ray examinations, physical examinations, laboratory tests, and bacteriological work are not considered—yet it is only by these processes that the activity and significance of any chest illness can be determined. This method of screening has been most useful in identifying persons with disease in a group. The individual can be removed from school, thus breaking a chain of possible new infections. If only this technique is used to detect tuberculosis, however, a number of active cases will be missed. Newell of Stanford, Yerushalmy and others of Berkeley, and workers at U.C.L.A. have demonstrated that approximately 30 per cent of active cases will not be found by using only x-ray survey techniques.[1] Double or triple reading of the small films will increase the number found, but still a few cases will be missed.

The second method of screening a group for cases of active tuberculosis is the use of the tuberculin test. Testing all members of a given segment of the population with an adequate strength tuberculin will detect over 99 per cent of those infected with tuberculosis. The positive reactors can then be further examined by x-ray and clinical means. This method is more difficult to administer since it requires at least two visits for everyone and three or more visits for the positive reactors, but it does have the educational value of alerting the individual who is a positive reactor to the fact that he has been infected and probably still harbors tubercle bacilli. Annual or semi-annual x-ray follow-ups can then detect any spread of disease in its early stages, when it is treated more easily. This technique, when used as the screening device, will, of course, identify any persons who have tuberculosis. It is, unfortunately, more time consuming and more difficult to administer than the x-ray survey since it requires the complete co-operation of the group tested. The majority of a college

[1] R. R. Newell, and R. Garneau, Threshold Visibility of Pulmonary Shadows, *Radiology, 56:* 409–414, March 1951; J. Yerushalmy, J. T. Harkness, J. H. Cope, and B. R. Kennedy, Role of Dual Reading in Mass Radiography, *Am. Rev. Tuberculosis, 61:* 443–464, April 1950.

group will co-operate in a given procedure, but there are always those who must be sought out or cajoled or threatened into compliance. This method also overlooks the incidental findings of the x-ray survey. Other chest conditions such as heart disease, tumors, and other infections found by the x-ray survey would not be identified by a tuberculin-testing program alone.

A third method of case finding in a student health service, not as accurate or as reliable as the first two, but still important, lies in the high index of suspicion of the clinical and professional staffs observing and serving these students. A careful scrutiny of the history of individuals having contact with open tuberculosis, the investigation of students with histories of frequent colds, coughs, pleurisy, and pneumonia, and a thorough study of people known to have inactive tuberculosis will yield a number of additional cases of active tuberculosis. A few years ago we showed that of eighty-five individuals with active tuberculosis actually found in the Student Health Service, 64 per cent would have been found by follow-up of x-ray survey, while 77 per cent would have been diagnosed without the survey in those students where history and clinical findings indicated the need for study to determine the presence or absence of tuberculosis.

An adequate tuberculosis case-finding program is concerned not merely with professional diagnostic work, but also with the administrative techniques employed. For example, it is of no use for a radiologist to identify a film as "suspicious of tuberculosis" if the report is lost in the files and not acted upon. A centralized organization of the tuberculosis program is all important. A single record in a separate file which has all pertinent and current information regarding each individual student suspected of having tuberculosis is essential. This file is in addition to the medical record required for every student on campus in a good student health service. This card file is constantly changing as names are added or dropped, depending on the progress and nature of the clinical findings. When a student who is found to have had active or inactive tuberculosis leaves the campus, his card can be carried in an inactive file. Each semester this old file should be checked against the current registrar's list to identify the students who return to the campus. These students' cards can then be reentered in the active file. Constant checks of the lists of those with suspected photofluorograms must be made to see that the large films

are taken and reported. Records of those cases having diagnostic work after "positive" large x-rays or of those clinic patients who are being studied because of symptoms should be followed closely. Such patients' cards may be kept up to date by sending duplicate reports to the central tuberculosis control office.

This centralized follow-up program implies not only adequate clerical help but also professional supervision to determine which cases are to be singled out for greater or lesser degrees of follow-up. Teamwork, interest, enthusiasm, and co-ordination on the part of radiologist, clinician, nurse, and clerical help, as well as simple but sufficient separate records, are essential if a tuberculosis case-finding program is to be adequate, effective, and efficient.

In summary, then, an adequate tuberculosis case-finding program should include the following:

1. A mass tuberculosis screening survey including every student, faculty member, and nonacademic employee. This could be done by either an X-ray survey or by a tuberculin-testing survey, or both.

2. Competent professional and laboratory services, either on campus or in other public or private agencies, for diagnostic studies.

3. A centralized administration with simple separate files for the tuberculosis program. This office should receive duplicate reports of work done on all tuberculosis or suspected tuberculosis cases.

4. A routine system for periodic follow-up of all suspect or inactive tuberculosis cases.

Some Guiding Principles in Handling Injuries of College Football Players

ALEXIUS RACHUN, M.D., CORNELL UNIVERSITY

A PHYSICIAN engaged in the practice of sports medicine, particularly if he also serves as team physician for a college football team, soon learns that there are several features about this type of work which set it apart from the general practice of medicine. He finds himself surrounded by an atmosphere of urgency. He notes that athletes tend to ignore painful, so-called minor injuries that would incapacitate most nonathletes; and when football players are afflicted with more serious injuries they seek to minimize them in the hope of expediting their return to action. The doctor learns how intense is the desire of these young men to play on a varsity team, and it becomes apparent to him that injured players who are unable to practice move down the ladder of their little hierarchy, their places being taken over by teammates waiting for just such an opportunity to demonstrate their prowess. After a while the attitudes of other individuals in relation to injuries to specific athletes are revealed: the coach's concern about the exact nature and prognosis of the injuries so that he can adjust his plans; the trainer's desire to expedite recovery as manifested by his feverish activities with physiotherapeutic and psychological armamentaria; and the natural concern of the parents of the disabled athletes. In addition, the doctor is besieged by the press and fans, especially when a star player is involved.

Against this exciting backdrop the team physician strives to temper

his judgment in handling these injured athletes. Eventually, two basic principles are worked out. First, he must be as sure as possible that by permitting a player to return to practice he is not exposing that player to further, more serious injury with permanent sequelae. Second, in all fairness to the player, to the team, and to the coaching staff, the team physician must not retain a player on the injured list longer than is absolutely necessary.

In evaluating the prognosis for injured athletes, the team physician soon discovers that functional recovery in this group is appreciably more rapid than it is among the nonathletic students. Perhaps it is the intense motivation together with early active use that works effectively in bringing back quick functional recovery in injured athletes. This is fortunate, because by midseason very few players have been spared one injury or another, mostly of a nuisance nature.

When faced with the question as to whether a player should be released from the injured list, the team physician must resort to careful thought and be guided by his experience. There is no guide book to go by, and each case has its own peculiarities which do not permit of rule-of-thumb practices. A few illustrative cases among Cornell University football players will serve to emphasize this fact.

(1) An outstanding first-string quarterback suffered substantial fractures of two transverse processes of the lumbar spine in a Saturday afternoon game. On the following morning, after an overnight trip back to Ithaca, he limped painfully and slowly from the train. He was sent to the Infirmary, where he confidently stated to the doctor that "he would be ready for next Saturday's game." On the following day (Monday) he felt well enough to leave the Infirmary. On Tuesday he was seen jogging heavily and disjointedly around the field. On succeeding days he quarterbacked the team in practice, and, true to his word, on Saturday he was ready for the game, playing most of it with scarcely perceptible evidence of an injury-handicap.

(2) A first-string halfback fractured the ramus of his mandible in a football game. His teeth were wired in the usual fashion, and he subsisted on a liquid diet. A week later in a regular game, with his mouth closed tightly by the dental wiring and with his face and jaw protected by a large wire mask, he broke loose for sixty-five yards to a touchdown.

(3) A lineman after the fourth day of fall practice reported to the

training room requesting that his hand be taped because of a "sprain." The trainer referred him to the team physician, who at once noted the obvious deformity of a fractured metacarpal with displacement. History revealed that the injury had, in fact, occurred ten days earlier in a baseball game, but that he hadn't paid any attention to it after its occurrence. He had to be persuaded to have a temporary cast applied.

(4) An outstanding defensive halfback suffered a very severe ankle sprain in a game necessitating immediate hospitalization and opiates for pain. The ankle swelled enormously overnight, and it appeared to be grossly deformed, although x-rays showed no bone injury or dislocation. In spite of the poor prognosis given to this ankle, a month later this player was back on the field, playing a key role in a win over a traditional rival.

As mentioned above, each case has singular features which individualizes it, rendering the use of standard procedures and standard prognosis inadvisable. Case (1) demonstrates the high degree of motivation that actuated this quarterback to return to practice so quickly. Once renal injury had been ruled out as a possible complication, it was felt that he could develop his own recovery program which he did. (Needless to say, his back was protected by tape and heavy padding both in practice and in games.) Had rule-of-thumb practices been employed in handling this case, he would have been *hospitalized* for about one week. Similarly, case (2) shows how quickly a highly motivated player overcame his injury-handicap. Protected as he was by a heavy wire mask, it was felt that it was safe for him to play as long as he desired to do so.

Case (3) is an example of the phlegmatic football player whose threshold for pain resulting from injury is extraordinary high. He is the type who shies away from doctors, and the team physician usually has to take the initiative in examining him for injury. It is entirely possible that this lineman could have continued playing with a simple protective bandage on his hand with no retardation of healing of his fracture. Most of the Cornell players with fractures of the metacarpal shaft other than that of the thumb have required rigid support for only three weeks or less. All these fractures have healed with no functional disability.

Case (4) with his severe ankle injury should have been properly

treated with rigid fixation of his leg with no weight bearing for several weeks. He resisted this proposal and chose to remain in the Infirmary for a few days; after this he became ambulatory on crutches for a few more days. Then, with intensive physiotherapy, he made rapid strides toward a functional recovery that resulted in his participation in an important game a month later. The average nonathlete probably would have required three to six months to obtain the same functional result obtained in this athlete in one month. It might be remarked that he played on the basketball team that winter with no recurrence of injury and that follow-up after his graduation revealed no residual disability.

A review of the injury records of other Cornell athletes reveals that many of them have lost *no* time from practice or games with injuries which have side-lined less competitive players. The injuries include: simple fracture of a rib or costal cartilage, simple dislocation or fracture of a digit, fracture of the nose, lacerations, and contusions. Proper protective devices or splints were worn following injury.

In contradistinction to the injuries enumerated above, internal derangements of the knee follow a different pattern. The demands of good football performance usually exceed the capability of this complex joint, when recently injured, to withstand the stresses imposed on it in spite of tape, brace, and intensive exercise. Early functional use and early return to practice usually result in recurrence of injury. Prolonged rehabilitation with slow return to practice has been found to be productive of better results. Of course, this does not apply to simple sprains of the knee, which recover much more quickly.

The thoughtful team physician will sometimes pause to consider whether he is wise in permitting these spirited young athletes to play with their injury-handicaps. There is some satisfaction in watching them overcome these handicaps almost by sheer determination, and he feels there is some kind of character development going on. Also, from a practical point of view, he realizes that he has but little choice; for the game of football is rough and injury of some degree is almost inevitable. At about midseason it would be virtually impossible to field a varsity team worthy of the name if each injury were treated according to the standard practice in the community at large. There is a grain of truth in the oft-used expression that "the team was held together by tape."

Case Reports of the Cornell University Infirmary and Clinic

FOOD POISONING

Dr. Wightman: "I think everyone here knows that we have been having an increased number of patients with gastrointestinal upsets. Over the years gastroenteritis has been one of the three most common causes for admission to the Infirmary. We have had an unusually large number of such cases admitted in the past two weeks. These have seemed to fall into two separate groups, and I want to discuss some of the points of difference between these two groups and thus introduce the subject of food poisoning, which Dr. Beaumont will discuss.

"One afternoon about two weeks ago we had the first inkling that something was wrong at one of the women's dormitories when a young lady staggered in here and collapsed; within an hour eight or nine others came in. These girls were all affected by severe nausea and vomiting and severe prostration; a few had mild diarrhea also. They each had a violent onset. They all seemed to get their symptoms between the hours of three and seven P.M. In all, we admitted twenty-seven girls to our Infirmary that afternoon and evening. Recovery was prompt, so that half or more of them were ready to be discharged the next morning. I think there were only three that had to stay through the following day.

"As soon as we became aware that there were a large number of ill people, we wanted to find out, if possible, the cause for this explosive outbreak of illness. I notified the local health officer, and he immediately went to the dormitory and began the investigation. He questioned the food handlers and many of those who were ill. He

took samples of the food which had been served at lunch and reviewed food-handling methods in the kitchen and dining rooms.

"He learned that there are two dining rooms in the dormitory, each serving about 240 girls. About 100 of those eating in one dining room became ill, and only about 30 who ate in the other had symptoms. Of 20 employees, 6 were ill. It was noted that a greater proportion of those who roomed in the top floor of the dormitory became ill than was true for those who roomed on the other floors.

"A few days before this the water supply had been disturbed during the installation of a new water line, and as a result tap water appeared muddy for a few hours. However, samples of water taken at the time of this present investigation were found to be within Board of Health limits of purity. Cultures made from a vegetable salad did show some *Staphylococcus aureus* and paracolon bacteria. The numbers of staphylococci were so small that *Staphylococcus* food poisoning seemed unlikely as a cause. The paracolon bacillus could be a cause, and some support is given to this view in that stool cultures from some of those who had diarrhea did contain paracolon bacilli. The uneven distribution between the two dining rooms is not easily explainable, however, as the food was all prepared in the same kitchen.

"In summary, an explosive outbreak of acute gastroenteritis occurred within a period of four or five hours. It was characterized by severe vomiting and prostration. It is believed to be food poisoning, but careful investigation by the County Health Department did not conclusively establish the cause.

"The second group of cases is rather different. We have had forty-six admitted to the Infirmary, and many others were treated in the Clinic. This illness differs from that just described. Over a two-week period forty-six patients have been admitted with a diagnosis of acute gastroenteritis. These have come a few at a time, although on the peak day there were thirteen admissions. They have been mostly men. There seemed to be no common factor in either living quarters or eating places. Some lived and ate in fraternities, others lived in dormitories or private rooms and ate at varied eating places both on and off campus. Some lived in apartments and prepared most of their own food. They complained of nausea, vomiting, and diarrhea, but the vomiting was less severe than that seen in the girls and was much less prostrating. In general diarrhea was more severe and prolonged.

Many had fever up to 102° in contrast to the girls, most of whom were afebrile, and on the whole recovery was slower, taking two to three days.

"This second group of cases was spread over a period of time; the disease was less severe but longer lasting and was more likely to be accompanied by diarrhea and fever. There seemed to be no common source of contagion, and we believe the most likely cause was a virus infection, although we have no proof of that.

"Now with these two illustrations of gastrointestinal disorders I will turn the discussion over to Dr. Beaumont, who will consider food poisoning in its broader aspects."

Dr. Beaumont: "First of all, a definition of food poisoning. A broadly used definition is the following: conditions arising from the ingestion of unwholesome food. Such conditions have in common an acute illness, often of an explosive epidemic nature characterized by one or all of the symptoms of nausea, vomiting, diarrhea, and pain. At first the etiological agents were believed to be products of food decomposition and putrefaction, commonly called ptomaines, from the Greek word *ptoma,* which means a corpse. This term was coined in 1870, and it is used today by laity. It is now realized, however, that putrefying or decomposing food is not necessarily poisonous. People in different civilizations eat putrefying foods, just as we eat limburger cheese and other cheese in which bacteria or molds have caused some degree of decomposition. Eskimos eat rotten seal meat, Chinese eat rotten eggs, and other cultures eat hare and similar game after it has become "high," believing it is improved in flavor.

"The agents of food poisoning are fairly accurately identified these days. While the term "food poisoning" is sometimes limited to acute gastrointestinal symptoms caused by bacterial contamination of food or drink, I will consider it briefly in a broader sense to include other substances which may cause gastrointestinal upsets.

"Several of these are found in the plant world. Many species of mushrooms cause serious or fatal illness if ingested. Ergotism gives rise to gastrointestinal symptoms as well as gangrene and vasomotor disturbances and is caused by the eating of rye which has the fungus growing on it. Water hemlock is a plant which grows in swamps and meadows, and children have been known to eat this and get gastrointestinal upsets. The milk from cows which eat snakeroot and jimmy

weed contains a poisonous alkaloid, trematol, which causes "milk fever" in people who drink the milk. Fava beans are much beloved by Italians, and Italian immigrants to this country often grow fava beans. Certain individuals are sensitive and, after eating the beans or even inhaling the pollen, develop illness characterized by prostration and a hemolytic anemia. Oxalic acid poisoning can be produced by using rhubarb leaves for greens, as is sometimes done during wartime food shortages. Belladonna or deadly nightshade is a very common poisonous plant. I will also include here mussel poisoning, even though the mussel is a shellfish rather than a plant. At times in some localities mussels ingest a poisonous plankton, and when such mussels are eaten poisoning results. Shellfish are frequently implicated in food poisoning. This is often because of their growth in sewage-contaminated waters rather than because of the poisonous alkaloid found in the mussels I have just described. I don't think this rather specialized poisoning is the cause of other shellfish poisoning.

"Chemical agents such as antimony, cadmium, and sodium fluoride may cause poisoning. Antimony is used in enameling processes. Cadmium is used in plating, and poisoning can result from food storage in cadmium-plated utensils. This is especially true of citrus fruit juices. Sodium fluoride is an insecticide which some people keep in the kitchen, and it is mistaken from time to time for bicarbonate. Arsenic and mercury are usually maliciously applied to people's food. However, quite a lot of work has been done on arsenical insecticides which may leave residues on fruit or other food crops which have been sprayed with them. If the food is eaten unwashed, the spray residue may be large enough to cause toxic symptoms. Aluminum has been implicated in poisoning of military personnel. In the last war G.I.'s carried their beloved Coca-Cola in their aluminum canteens and came down from time to time with this poisoning. Methyl chloride is a refrigerant used in refrigerators, and sometimes food is contaminated by leakage of this poison. That very briefly takes care of the plant and chemical poisons and brings us on to the main topic, that of bacterial food poisoning.

"There are two main types of bacterial poisoning: that which is caused by the ingestion of a toxin which has been preformed in the food by bacteria and that which is produced by active infection by bacteria. Two common organisms causing the second type are those

of the genera *Salmonella* and *Streptococcus*. The toxin-forming group include the genera *Staphylococcus* and *Clostridium*. Before discussing the differential diagnosis of these various types of disease, I will briefly describe the more common types.

"Staphylococcal poisoning is the most common form of food poisoning and is caused by an enterotoxin which is formed before the food is ingested by certain strains of *Staphylococcus aureus* or *albus*. Given the right conditions of temperature, pH, food which is a good culture medium, and enough time, toxins are formed. Ingestion of the food results in illness if a sufficient titer has been formed in the food. A food infected with staphylococci may not give rise to gastrointestinal symptoms if it has properly been refrigerated, but if unrefrigerated for several hours it is likely that toxins will have formed in sufficient quantity to produce symptoms. The source of the staphylococci is usually from infections of the skin, ears, noses, or throats of food handlers. It wasn't until about 1930 that this cause of food poisoning was recognized. Before that, attempts had been made to incriminate the *Salmonella* organism in all cases of food poisoning.

"The salmonellae first had been shown to cause disease by Getner in 1888 when a German student ate a pound and a half of raw beef and became ill and died. Getner sought the cause and isolated an organism which he called *Bacillus enteritidis*. Since that time over forty species, comprising nearly 1,500 strains of *Salmonella* have been identified. These organisms are broadly distinguished by their ability to produce a disease which is either primarily septicemic such as is seen in typhoid and paratyphoid fevers or a disease characterized by predominant gastrointestinal symptoms, constituting a typical picture of food poisoning. The illness is caused by an infection produced by living organisms, and it develops after an incubation period of from seven to seventy-two hours, during which time the ingested *Salmonella* organisms multiply and invade.

"Some of the more commonly encountered species of *Salmonella* are *S. typhimurium, S. enteritidis, S. newport, S. oranienberg,* and *S. montevideo. Salmonella* species are widely distributed, and food poisoning has been traced to many sources, such as to human cases or carriers, cats, dogs, swine, and poultry. Eggs have been the source of numerous outbreaks. During World War II under the Lend Lease program the United States exported dried eggs to her European allies,

and numerous outbreaks of food poisoning were traced to the dried eggs. It was found that about 10 per cent of the eggs contained *Salmonella* organisms and that we had thus unwittingly exported food poisoning to the Allies. Salmonellae have also been isolated from rodents, and since food is often exposed to possible contamination by rodents they must be considered as a potential source of infection. Flies have been incriminated in the spread of salmonellae in some instances.

"A few outbreaks of food poisoning have been traced to *Streptococcus faecalis*. This, like *Salmonella* food poisoning, is due to infection by living bacteria and not due to bacterial toxins. It is less severe than the other types and has an incubation period of five to twelve hours.

"Botulism, like staphylococcal food poisoning, results from eating food in which organisms have grown and produced toxins. The responsible organism is *Clostridium botulinum*, which is a spore-forming anaerobic soil bacterium which is widely distributed thoughout the world. The word "botulism" is derived from a German word *botulus,* meaning a sausage, and was used by German physicians to designate a type of food poisoning resulting from the ingestion of spoiled sausage. In Europe most cases of botulism have followed the eating of preserved meats, while in the United States home-canned vegetables have caused the greatest number of cases. There have been no outbreaks of botulism from commercially canned foods since 1925.

"The growth of *Clostridium botulinum* and its production of toxin are variable, being dependent on factors of temperature, pH, and nutrients present. It has generally been thought that acid foods are not a source of danger, but this is not invariably so as outbreaks have been traced to acid foods such as canned tomatoes and fruits. It is true, in general, that nonacid vegetables such as beans, corn, beets, spinach, and asparagus are the most common source of botulism. The prevention of botulism is best achieved by proper heat sterilization of canned food, which can only be accomplished with certainty by processing in a pressure cooker.

"Food in which growth of *Clostridium botulinum* has occurred frequently has an unpleasant rancid odor and a taste that is described as sharp or acrid; however, suspected food should never be tasted unless it has been heated to boiling temperature so that the heat-labile

toxin is destroyed. The toxin in even a taste of unheated food has been sufficient to cause serious illness.

"The chief symptoms of botulism are those due to the effects of the toxin on the central nervous system and appear usually within twelve to thirty-six hours, although periods as short as four hours and as long as 108 hours have been reported. The characteristic symptoms are difficulty in swallowing, double vision, respiratory difficulty, and finally death from paralysis of the muscles of respiration. In a fair number of cases these symptoms are preceded by nausea, vomiting, and diarrhea.

"There is a very interesting story I thought you might be interested in, for it illustrates the interesting way botulism strikes. On September 14, 1936, in a small town in the Midwest five people sat down to a meal consisting of potatoes, boiled bologna sausage, home-canned string beans, bread, butter, and coffee. These five consisted of C. A., owner of a small country hotel, his wife, and three boarders, A. J., J. R., and J. S. They all ate this meal. The beans, home canned by the so-called cold-pack method, were noted to be slightly foamy and faintly rancid in odor when the Mason jar was opened. The landlady questioned their edibility, but J. R., one of the boarders, assured her they would be all right if they were rinsed in cold water. Whereupon she disappeared into the kitchen and rinsed them five times in cold water. These beans had been purchased from a truck distributing vegetables from a nearby farm and were offered for sale in the small shop attached to the hotel. They were not all sold, and the hotel-keeper thriftily canned those left. The boarder J. S. detected a rancid odor when the beans were passed to him. He turned his nose up and took none. He described the odor as being something like limberger cheese, but not strong enough to be offensive. He was the only one who ate none of the beans, although he had eaten heartily of all the other food; likewise he was the only one to be alive and well forty-two hours later.

"Bacteria other than the four just discussed have been incriminated in some outbreaks of food poisoning, but in many cases the evidence has not been conclusive. There have been several reported instances of gross pollution of water supplies by sewage with resultant outbreaks of nausea, vomiting, and diarrhea. Certain strains of *Escherichia coli* have been isolated in outbreaks of infant diarrhea which have been

considered pathogenic. Also some of the paracolon organisms have been considered by some workers to be capable of causing gastrointestinal illness. Evidence for this belief is based on recovery of these organisms from the stools of affected persons and by an increased titer of serum agglutinins for the suspected bacteria in those who have been ill. It has been suggested that much of the diarrhea experienced by travelers when no apparent cause can be found is due to contamination of food with either the pathogenic strain of *Escherichia coli* or the paracolon group.

"The differential diagnosis in food poisoning must include other diseases than those just discussed. I will briefly mention some of the more important of these.

"Bacillary dysentery may cause outbreaks of gastrointestinal disease in which diarrhea is the outstanding symptom. In these outbreaks the cases keep appearing over a period of days rather than within a few hours or a day as is true in food poisoning. The final distinction is made by culture of *Shigella* organisms from the stools of those affected.

"Infectious hepatitis may occur in epidemic form and cause nausea and vomiting. Here again new cases appear over a period of days or weeks, the onset tends to be insidious, and some cases will develop jaundice, which gives the final proof of the cause.

"Amebic dysentery may also occur in epidemics, and again the new cases develop over a period of weeks or even months. The diarrhea frequently is severe with bloody stools. The demonstration of *Endamoeba histolytica* in the stool establishes the diagnosis.

"Trichinosis occasionally is confused with food poisoning, as diarrhea and nausea and vomiting may be present in the early stages. Further development of the disease with the facial edema, severe myositis, and marked eosinophilia tend to differentiate it from other conditions.

"There is a large group of epidemics of acute gastrointestinal upsets which may be of viral origin. The second group of cases which Dr. Wightman described seems to fall in this category. Some workers have presented evidence of the viral origin of epidemics which seems valid. Volunteers have contracted the disease by inhaling nebulized stool filtrates and by ingesting similar preparations. In some outbreaks attempts to demonstrate the presence of a virus have failed.

"The second group of cases which Dr. Wightman described illus-

trate this viral form, which is characterized by the development of new cases over a period of time. There is no common time or place factor for eating. There usually is a factor of association together in dormitories and classrooms. A fairly high percentage of cases have mild upper respiratory symptoms and an appreciable degree of fever. Recovery usually occurs in two or three days.

"To conclude, I would like to discuss the investigation of an outbreak of food poisoning. There is a very nice article in the *American Journal of Public Health* by Dr. Milton Feig, who discusses the investigation of outbreaks of food-borne diseases.[1]

"The primary purpose of such an investigation is really to prevent further occurrences of food poisoning rather than to do something specific about the one under study. Speed in starting the investigation is important. First, determine the responsible meal. This is done by establishing from the histories of the people affected a common time-place factor. In instances where the incubation period is short this is readily accomplished. In certain instances where a utensil probably is responsible and foods have been prepared for several successive meals in the same utensil without proper cleansing, then the place factor is significant, the time factor not so important. Second, determine the responsible food. This is done by going to patients and establishing the common food eaten at the suspected meal. Samples of all foods available are taken, and a copy of the menu should be provided by the proprietor or the director of the establishment and these foods examined. Names and addresses of all those who partook of the meal, whether they were ill or not, should be learned so that histories can be taken from them. Success in determining the responsible food is necessary for continuing the investigation, which is then directed toward finding the source and the method of contamination of the responsible food. This is done under three headings. First, obtain information from the people at the site of the outbreak; the local sources of the foods, brand names of foods, names of packers or manufacturers, how packaged, how transported, how long in transit, time of arrival at place of consumption, how stored until used, how and when prepared for serving, names of those who handled and prepared it, how long from time of preparation until it was eaten, and

[1] Milton Feig, The Investigation of Food-Borne Outbreaks of Acute Gastroenteritis, *Am. J. Pub. Health, 42:* 1535–1541, 1952.

how it was stored during this interval. Second, get information from the suppliers of the food. This may mean going back to the retailer, wholesaler, canner, slaughterer, or farmer and asking them the same sort of questions—where kept, how long stored before shipping, who handled it, and so on. Third, find the ultimate source of contamination. That is, the human carrier, the animal carrier, or other source of infection. Handlers should be examined thoroughly and a history of recent illness taken. Stool specimens and nose and throat secretions should be cultured. If salmonellae have been found or suspected, all food handlers should have at least three negative stool cultures before being allowed to resume work. Flies are often incriminated in the initial infection of food, and attention should be paid to the methods of sanitation and general hygiene of eating places.

"The final task is to determine the etiological agent. The epidemiological pattern, especially as manifested by the incubation period and the clinical picture of the illness, may enable one to make a good guess, but the final diagnosis in most instances rests on laboratory verification. This includes identification of the responsible organism in the carrier and the food, and in cases of *Salmonella* infection in the patients also.

"In cases of botulism the presence of toxin in food can be demonstrated by inoculating mice with extracts of the suspected food and then observing the development of botulism symptoms. Cultures are not very significant, as the presence of *Clostridium botulinum* bacteria or spores is not proof that toxins have been produced. The bacteria and the spores themselves are not harmful when ingested.

"This sums up what I thought you would be interested to hear. Much of the information is from a book by Dr. G. M. Dack."[2]

Dr. Wightman: "Miss McCormick, you saw many of the girls in the dormitory during this outbreak. Do you have anything to add?"

Miss McCormick: "There was a great deal of nausea and vomiting and a lot of prostration. There did not seem to be many who had much diarrhea."

Dr. Wightman: "It is rather interesting that one boy became ill about an hour before any of the girls became ill. We learned that he worked in the kitchen and ate before he started work that lunchtime."

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[2] G. M. Dack, *Food Poisoning*, 3d ed. (Chicago, 1956).

ACUTE BENIGN PERICARDITIS

Dr. Wightman: "Today we are going to discuss a case that has been very interesting. The case history will be given by Dr. Moss. I'll make a few comments on one phase of the problem, and then Dr. Beaumont will discuss it at some length."

Dr. Moss: "Miss H. is a twenty-one-year-old student, and we first saw her on September 14, when she came into the Clinic complaining that she had a pain in her shoulder and that this was made much worse when she breathed. Dr. Wightman saw her then and he found nothing abnormal. He did suggest that she come to the Infirmary so that we could investigate this pain, but she felt quite well apart from the pain and she didn't want to come in. The next time we saw her was on September 26, when she was seen again at the Clinic and was admitted to the Infirmary.

"Her history was that for eighteen days she had had pain in the chest, dull and aching in character and bilateral in distribution. It was around the shoulder region and in the submammary region. It was much worse when she laid down. This pain was rather interesting. It was the most noticeable thing in the whole illness, this pain which was worse when she took a deep breath and very much worse when she laid down. She also felt rather feverish, noted malaise, and did not feel like eating. She had had some dyspnea which gradually had become worse over this period of eighteen days. For ten days before admission she had a dry cough which hadn't worried her very much; it was just a slight cough. Her past history showed nothing of real importance. She had no history of rheumatic fever. She had had infectious mononucleosis in December of last year, but no other illnesses of note.

"On examination she was pale, and she was very uncomfortable when she laid back. The only way she could get comfortable was to sit upright and hold her shoulders back. She had a temperature of 102°. Her throat had some lymphoid hyperplasia. There was no adenopathy. A few crepitations were noted at the left base, and her respiratory rate was 30 per minute. Pulse rate was 120 per minute and quite regular, and the blood pressure was 100/70. The heart was slightly enlarged, but no murmurs were heard. The skin showed nothing of note.

"A provisional diagnosis of virus pneumonia was made, and a few observations were made on the afternoon she was admitted. The white blood count was 8,200, with 81 per cent polymorphonuclear cells and 23 stab forms. Her hemoglobin was 9.9 grams. We took a chest x-ray, which Dr. Showacre reported as showing an enlarged heart, which might be due to effusion or possibly to dilatation. We have a chest x-ray of January 1956, and the comparison with the admission film is rather interesting. In the January film the transverse diameter of the heart measures 11.7 centimeters. In the x-ray taken on the afternoon of admission the transverse diameter is 16 centimeters. There is also a little haziness in the lower part of the left lung field. A blood culture was also taken on the day of admission.

"After admission she complained of increased pain. We thought the diagnosis at this point was most likely to be rheumatic fever. She was in the right age group. She had an enlarged heart and fever. We couldn't quite explain the pain on this basis, but we started her on salicylate therapy. She had fever of 102° at that point. The following morning she complained of increased pain and appeared more ill. The pain was substernal and also in the right shoulder and right upper chest. We found that the apex beat was in the anterior axillary line and it was very forceful. The heart sounds were quite clear. We couldn't hear any murmurs, but there was a pericardial friction rub which was audible only over the tricuspid area. We felt that the fact that the heart sounds were clear and that there was a rub was rather against pericardial effusion. She didn't show any evidence of cardiac failure, had no joint symptoms, no subcutaneous nodules or any petechiae or hemorrhages. An erythrocyte sedementation rate was 54 mm. in one hour. A tuberculin test using the first strength was negative. An electrocardiogram was normal with a P-R interval under 0.2 seconds.

"Her temperature varied during the day from normal levels in the morning to as high as 103.2° in the afternoons, with the peak falling a little lower on each succeeding day, so that by the seventh day the temperature remained normal. Salicylates were continued for five days. Her heart rate came down quite a bit, to 100, and it stayed at 100 or a little below the rest of the time she was here.

"At this point we decided that the most probable diagnosis was benign pericarditis, and because it has been reported that the broad

spectrum antibiotics are of value in this condition we started treatment with Achromycin, 250 mg. four times a day. Salicylates were stopped on the following day. A chest x-ray taken on October 1 shows considerable reduction in heart size, with the transverse diameter down from 16 to 13 cm. On October 4, the leucocyte count was 5,100, with 68 per cent neutrophils. The erythrocyte sedimentation rate was still elevated, being 51 mm. in one hour. She improved steadily and gradually became free from pain. The heart size decreased a bit more to a transverse diameter of 12.8 centimeters.

"On October 9, Achromycin was stopped. Within thirty-six hours she had return of chest pain of fairly severe degree. On October 11, the laboratory reported that the blood culture taken on September 26 showed growth of a streptococcus. On the next day a blood culture which had been taken on September 27 also showed growth of a similar streptococcus. These were later identified as a strain of Beta hemolytic streptococcus.

"This event upset all our thinking and planning in regard to the diagnosis and management of the case. Up to this point we felt that we were dealing with a case of benign pericarditis which was progressing quite satisfactorily. The positive blood culture changed the picture entirely. These cultures seemed significant and not just contaminants. The delayed appearance and scanty growth as well as two consecutive positive cultures seemed to rule out possible contaminants. A third culture taken after Achromycin had been started remained negative.

"We had to look at our diagnosis again, and we were not quite sure what to make of it. She had myocarditis, as evidenced by the cardiac dilatation and tachycardia. The evidence in favor of pericarditis was the pain which seemed characteristic and a friction rub, and in the electrocardiogram there were T-wave changes such as are common in pericarditis. The blood cultures, of course, suggested subacute bacterial endocarditis. Against this latter diagnosis was the absence of a murmur, the absence of petechiae, and the negative history for rheumatic or congenital heart disease. In view of the positive blood culture and the recurrence of chest pain we decided to resume treatment with Achromycin. So it was begun again after a lapse of two days. Again the pain decreased and after a few days was no longer severe, but she still complained of mild pain on occasion. She toler-

ated gradual increase in activity and was considered to be ready for discharge to her home for additional convalescence on the twenty-fifth day."

Dr. Wightman: "As you can see, this case raised some questions, both as to diagnosis and as to treatment. We didn't feel too sure of the exact diagnosis. She had responded well to Achromycin in the first two weeks, so that when the blood cultures were reported positive on the fifteenth day we felt it wise to continue with it, and she seemed to do well. She was to continue it after her discharge. How long will have to be determined by changes in the sedimentation rate and further blood cultures and her subsequent clinical course.

"One of the interesting features of the case was the pain. She said that during the period from September 14 until she entered the Infirmary she felt well during the day while she was active but that when she went to bed she had chest pain. I looked up a bit about pain in pericarditis, and I would like to make a few comments on this subject.

"One researcher did some work on pain perception in the pericardium. In a case of pericarditis with effusion he was able to introduce an electrode into the pericardial sac and so produce an electrical stimulus to the pericardium. The subject didn't experience any pain. He was able to do that in several areas of the pericardium. However, when the stimulus was applied to the inferior part of the pericardium where it is continuous with diaphragm, pain was produced. These pain fibers are thought to be part of the phrenic nerve distribution. This is believed to explain the fact that the pain of pericarditis is often referred to the neck, shoulder, and the upper part of the left arm. The pericardium seems to be insensitive to pain except for the inferior part which lays on the diaphragm.

"Pain in pericarditis has been subjected to some study. The pericarditis which is seen in some cases of uremia is painless. You may remember a case we previously presented who had a tremendous amount of pericardial effusion. He didn't complain of pain; he had dyspnea but no pain even though the pericardium was stretched by the large amount of fluid. It is believed that when there is infection there is more apt to be pain. It is thought that pain is produced when the infection spreads through the pericardium and causes inflammation of the pleura. That is, the pain arises in the pleura or possibly

mediastinal structures rather than in the pericardium itself. The increased pain produced by changes in posture, especially by lying down, are probably due to increased pull on the inflamed structures. Now, from this point on, Dr. Beaumont will take over the discussion."

Dr. Beaumont: "First I will list some causes of acute chest pain and then discuss a few of them which seem to have some bearing on this case. Chest pain may be caused by myocardial infarction, pulmonary embolism, pericarditis or pleuro-pericarditis, acute pleurisy, spontaneous pneumothorax, angina pectoris, mediastinal emphysema, diaphragmmatic hernia, acute abdominal conditions, and sometimes by spinal lesions. Our case today seems to be an example of the pleuropericardial type, and I believe it is a case of acute nonspecific or benign pericarditis.

"Acute nonspecific pericarditis was first described in 1884 in a woman aged forty in the Massachusetts General Hospital. She came in with fever, pain in left side of chest, palpitation, weakness, and nausea. The physician blistered her chest (this was a frequently used remedy then), and she got better. He was impressed by the case and the good result which he understandably attributed to his treatment, and so he described it in a paper. Not until 1942, when a review of 14 cases was published, did benign pericarditis come to be a well-known entity. These cases were of both sexes and varied in age, with a mean of forty-five years. Eight of these cases had an antecedent history of recent respiratory infection. In a larger series of 200 cases the following observations were made: males predominated; the age ranged from infancy to over seventy years, averaging thirty-five years; previous history of respiratory infection in over 60 per cent. These respiratory infections had been diagnosed as "grippe," common cold, acute pharyngitis, pneumonia, or bronchitis. The average interval from the respiratory infection until onset of pericarditis was twelve days.

"The presenting symptom in 50 to 60 per cent of cases is chest pain. In half it occurs suddenly, and in the other half it may occur intermittently or develop gradually over several days before the full picture is developed. Complete absence of pain is rare. The site of the pain is usually precordial or substernal, frequently radiating to the left shoulder and less frequently to the right shoulder, to the neck, to the back, to the costal margins, or to the left arm. Rarely radiation of the

pain is to the epigastrum, to the jaw, or to the right chest. So here we have a group of people with acute chest pain radiating to the arm, neck, or shoulders and who have an average age of forty-five, so you can see straightaway that there is going to be much difficulty in getting to the diagnosis. The character of the pain is variable, often described as being a tight or a gripping pain. As you can easily see, the diagnosis is not easy in a patient who is complaining of pain of this character and distribution and who may be forty-five years of age or older. A second symptom and one present in a third of all cases is that of dyspnea. It is probably not a true dyspnea due to pulmonary congestion, but is thought to be a result of shallow respiration as a consequence of the pleuro-pericardial type of pain. A third of the patients have cough. Malaise and fever are seen in 95 per cent of patients. So there are the more common symptoms, pain, cough, dyspnea, malaise, and fever. Less frequently encountered are nausea, vomiting, and anorexia.

"Now let us consider the physical findings in cases of acute benign pericarditis. Fever is usually present on the first day and is around 102° as a rule, but is has been reported as high as 105°. A pericardial friction rub is heard in 70 per cent of cases, and it is usually heard on the first day the physician sees the case. It may be heard within a few hours of the onset of the illness. It is said to be louder and more extensive than that of myocardial infarction. Its average duration is nine days, but it has been reported as long as sixty days. In myocardial infarction a friction rub usually does not develop for thirty-six hours. The heart sounds may or may not be distant, and the occurrence of a distant heart sound is regarded as evidence of a pericardial effusion. Shock is a very rare occurrence with pericarditis, and its presence suggests myocardial infarction. Cardiac tamponade is rare. Therapeutic paracentesis is therefore rarely necessary. Congestive failure is also uncommon in this disease. A very interesting finding in 30 per cent in one series of patients and 70 per cent in the other was a left-sided pleural effusion. Sometimes this is bilateral. It so commonly occurs that it has been suggested that pericarditis is an indication of a polyserositis and is not just a single entity.

"Laboratory tests are not specific but are of value. Usually there is leucocytosis of over 10,000 with polymorphonuclear cells predominating. This leucocytosis occurs on the first day, which is somewhat

earlier than in infarction. The leucocytosis lasts for about three weeks. The sedimentation rate is raised in all cases. Again, this occurs early, probably on the first day. It is useful as a guide to recovery, gradually falling to normal. Blood and urine cultures are negative. Albuminuria is sometimes found. Nasal cultures show only normal bacterial flora. The blood contains no cold agglutinins and no anti-streptolysins. As I said, paracentesis has to be done infrequently, but on the occasions it has been done the pericardial fluid has been found in some to be hemorrhagic, in some brown, and in some straw colored. Cytology of this fluid shows a leucocytic reaction as a rule.

"The x-ray findings are interesting in that an enlarged cardiac outline occurs in over half of the cases. As large pericardial effusions are rare, this enlargement is usually due to cardiac dilatation. It alters quickly with time, and I think that point is brought out quite well in our case. In five days there was a very significant reduction in the heart outline. There is usually an absence of heart failure, gallop rhythm, and irregularities, though they do sometimes occur. Electrocardiograms are usually of normal voltage, which points to a minimal amount of myocardial damage. The electrocardiographic findings are quite specific. On the first day there is an elevation of the S-T segment. This elevation characteristically has a concavity pointing upward, and this differentiates it from the S-T segment elevation of infarction, which characteristically is convex. This elevation may last only a few hours or it may last a few days. It then returns to the base line and remains normal. This is followed by T-wave inversion, about a week after the onset of the illness. This lasts at least a few days and may continue to remain inverted or isoelectric for some months.

"The average duration of the illness was seven and one-half weeks, with a maximum of twelve weeks. The prognosis is excellent. There was only one fatality in 200 cases reported, and that arose as a result of an acute hemopericardium which developed because the patient was regarded as having an infarction and was treated with dicoumarol. Recurrences of the disease are common, being seen in 20 per cent. A few have several recurrences. For example, a boy aged fourteen had nine attacks in four years, and a woman aged forty-four had nine attacks in thirteen months. The disease can recur in a matter of a few weeks or after as long as ten years. The recurrence is usually less severe than the original attack. Some observers have made

the observation that a few people who have had this disease complain of chest pain after the acute illness has subsided. This doesn't seem to have any connection with constrictive pericarditis, as it is believed that constrictive pericarditis does not follow this disease.

"I would just like to say a few words about the differential diagnosis. It is most important to differentiate acute benign pericarditis from acute myocardial infarction. The pain is usually milder in this disease than it is in infarction and it may be intermittent. It often is aggravated by twisting of the body and is usually worse in the supine than in the sitting position. Fever occurs earlier and is higher; the friction rub occurs earlier and is more widespread; the sedimentation rate is raised earlier than in infarction and leucocytosis occurs earlier. Shock is rare in pericarditis, common in the other disease. There are differences in the electrocardiogram, the most important of which is the presence of a Q wave in myocardial infarction and its absence in pericarditis. The changes in the S-T segment and the T wave may on occasion be very similar in both conditions and so cannot be fully relied on for differentiation.

"Other causes of pericarditis must also be considered in the differential diagnosis. Tuberculous pericarditis is suggested by a positive tuberculin test, evidence of tuberculosis in some other part of the body, the progressive downhill course if untreated, the absence of pain, and by bacteriological examination of pericardial fluid. Rheumatic pericarditis—is one possibility in which we are particularly interested in this case—usually has minimal chest pain. There is evidence of endocarditis. In a group of cases of rheumatic pericarditis there was a murmur heard in all. Serological studies also help to distinguish rheumatic pericarditis, for antistreptolysins are found in all manifestations of rheumatic fever. Also joint manifestations are common in rheumatic pericarditis but are not found in acute benign pericarditis.

"The etiology of this disease is still unknown. At least four theories have been advanced. A virus etiology has been advanced because of the association with a preceding respiratory tract infection. It may occur in epidemics as virus diseases do, and bacteria are never found in the pericardial fluid. Against the viral origin is the leucocytosis, which is unusual in viral diseases. Tuberculosis has been suggested with the thought that pericarditis and pericardial effusion are anal-

ogous to the pleurisy and pleural effusion seen in tuberculosis. There seems little to support this theory.

"Toxins have also been suggested as a cause for this condition, but there seems to be very little evidence in favor of this.

"A more recent proposal relates acute benign pericarditis to the postcommissurotomy syndrome seen in patients who have had surgery for the relief of mitral stenosis. There are certain resemblances in the clinical and laboratory pictures of these two conditions. Both frequently combine pericarditis, pleurisy, and pneumonitis. There is frequently pain of a pleuropericardial type. There is fever, leucocytosis, and an elevated sedimentation rate in both diseases. Relapses are not rare, and the prognosis is almost always favorable. The postcommissurotomy syndrome has been considered by many to represent a reactivation of the rheumatic process which was initially responsible for the mitral stenosis. It is reasoned therefore that since benign pericarditis and the postcommissurotomy syndrome are so alike they have the same etiology, namely rheumatic fever. It must be noted, however, that not all observers are agreed that the postcommissurotomy syndrome represents a reactivation of rheumatic fever.

"The treatment of acute benign pericarditis is symptomatic. An occasional case seems to respond to salicylate, but this occurrence suggests that it is rheumatic pericarditis rather than benign pericarditis. Some have reported excellent results with the administration of tetracycline; others have denied that it is of benefit, so its exact status is not clear at present. Recently six cases of benign pericarditis in children were reported to have experienced immediate relief from symptoms when steroids were given. If further experiences substantiate this, the steroids may prove to be the best symptomatic treatment."

Dr. Wightman: "Thank you very much. We were startled when we got that blood culture report. We still don't know how to fit that into the picture."

Dr. Rachun: "That is exactly what I have been going over in my mind. If it wasn't for the positive blood cultures, this case would fit in almost every detail with a diagnosis of acute benign pericarditis. I wonder if the positive cultures are really indicative of a subacute bacterial endocarditis, or do they merely represent a transient bacteremia? The pain, too, was so characteristic of benign pericarditis, and I am not aware that it occurs in subacute bacterial endocarditis."

Dr. Wightman: "We felt that we could not disregard the blood cultures and so resumed the tetracycline. Further blood cultures have been negative, but we feel that the antibiotic should be continued for some time. How long will have to be decided on the basis of sedimentation rate determinations and the clinical course. She has been given a medical leave of absence for the rest of this semester so that she can have sufficient time for convalescence."